Electronic Version
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Claims

[c1] *1.* A method of controlling a hybrid electric vehicle, wherein said hybrid vehicle incorporates a recuperated turbine engine, said method comprising controlling a fuel flow to said recuperated turbine engine so as to convert heat energy to useful work, wherein said heat energy is stored in a recuperator of said recuperated turbine engine as a result of operating said recuperated turbine engine, and the operation of controlling said fuel flow is in anticipation of shutting down said recuperated turbine engine.

[c2] *2.* A method of controlling a hybrid electric vehicle as recited in claim *1*, wherein said operation of controlling said fuel flow comprises decreasing said fuel flow over time.

[c3] *3.* A method of controlling a hybrid electric vehicle as recited in claim *2*, wherein said operation of controlling said fuel flow comprises shutting off said fuel flow while operating said recuperated turbine engine using heat from said recuperator to heat air that is compressed by a compressor of said recuperated turbine engine.

[c4] *4*. A method of controlling a hybrid electric vehicle as recited in claim *3*, wherein said recuperated turbine engine is used to charge an energy storage device of said hybrid electric vehicle after said fuel flow is shut off to said recuperated turbine engine.

[c5] *5*. A method of controlling a hybrid electric vehicle as recited in claim *3*, wherein said recuperated turbine engine is used to charge an energy storage device of said hybrid electric vehicle after said vehicle is shutdown upon reaching a destination.

[c6] *6*. A method of controlling a hybrid electric vehicle as recited in claim *1*, wherein the operation of controlling said fuel flow is in anticipation of said vehicle reaching a destination.

[c7] *7*. A method of controlling a hybrid electric vehicle, wherein said hybrid vehicle incorporates a recuperated turbine engine, said method comprising:

a. monitoring a condition of said recuperated turbine engine;

b. shutting off a fuel flow to said recuperated turbine engine; and

c. resuming said fuel flow to said recuperated turbine engine so as to resume operating said turbine engine, wherein the operation of resuming said fuel

flow is initiated prior to a time when said condition would indicate that said recuperated turbine engine would not likely start without requiring a source of energy external to said recuperated turbine engine to rotate a compressor of said recuperated turbine engine.

[c8] *8*. A method of controlling a hybrid electric vehicle as recited in claim *7*, wherein said condition comprises a temperature of a gas stream that interacts with said recuperator.

[c9] *9*. A method of controlling a hybrid electric vehicle as recited in claim *7*, wherein said condition comprises a rotational speed of said recuperated turbine engine.

[c10] *10*. A method of controlling a hybrid electric vehicle as recited in claim *7*, wherein said recuperated turbine engine is installed in a vehicle, and the operation of shutting off a fuel flow to said recuperated turbine engine occurs when said vehicle is in a mode of operation that does not require power from said recuperated turbine engine.

[c11] *11*. A method of controlling a hybrid electric vehicle as recited in claim *7*, wherein while said fuel flow is shut off prior to the operation of resuming said fuel flow, shaft

power from said recuperated turbine engine is used to generate electrical energy that is stored in an energy storage device of a hybrid electric vehicle.

[c12] *12.* A method of controlling a hybrid electric vehicle, wherein said hybrid vehicle incorporates a power generator, an energy storage device and a traction motor, said method comprising:

a. determining at least one location of the vehicle;

b. determining a measure responsive or related to an amount of energy required for said vehicle to reach a destination, wherein said measure is responsive to said at least one location of said vehicle in relation to said destination;

c. at least reducing the power generated by said power generator responsive to said measure in advance of said vehicle reaching said destination; and

d. continuing travel of said vehicle to said destination using said traction motor powered at least by said energy storage device

[c13] *1 3.* A method of controlling a hybrid electric vehicle as recited in claim *12*, wherein said at least one location of the vehicle is determined with a vehicle location sensor in the vehicle.

[c14] *14.* A method of controlling a hybrid electric vehicle as

recited in claim *13*, wherein said vehicle location sensor comprises at least one of a GPS navigation system, an inertial navigation system, a dead reckoning navigation system, and a map matching navigation system.

[c15] *15*. A method of controlling a hybrid electric vehicle as recited in claim *12*, wherein said destination is automatically determined responsive to a driving pattern of said vehicle inferred from said at least one location in view of information related to previously stored driving pattern for said vehicle.

[c16] *16*. A method of controlling a hybrid electric vehicle as recited in claim *12*, wherein said measure is responsive to a distance of said vehicle to said destination along a predicted route to said destination.

[c17] *17*. A method of controlling a hybrid electric vehicle as recited in claim *12*, wherein said measure is responsive to an estimate of energy required to reach said destination along a predicted route to said destination.

[c18] *18*. method of controlling a hybrid electric vehicle as recited in claim *12*, wherein said measure is responsive to previously stored information corresponding to said at least one location of said vehicle for subsequent travel along a predicted route to said destination.

[c19] *19.* A method of controlling a hybrid electric vehicle as recited in claim *12*, wherein said previously stored information is responsive to the energy that had been required during at least one previous trip to reach said destination along a predicted route to said destination.

[c20] *20.* A method of controlling a hybrid electric vehicle as recited in claim *12*, wherein said previously stored information is responsive to an average of a plurality of previous trips from said at least one location of said vehicle to said destination along a predicted route to said destination.

[c21] *21.* A method of controlling a hybrid electric vehicle as recited in claim *18*, wherein the operation of at least reducing the power generated by said power generator comprises decreasing a fuel flow to said power generator over time.

[c22] *22.* A method of controlling a hybrid electric vehicle as recited in claim *19*, wherein the operation of at least reducing the power generated by said power generator comprises shutting off a fuel flow to said power generator.

[c23] *23.* A method of controlling a hybrid electric vehicle as recited in claim *22*, further comprising generating power

with said power generator after said fuel flow is shut off to said power generator, and using at least a portion of said power generated by said power generator to store energy in said energy storage device.

[c24] *24.* A method of determining a likely destination of a vehicle, comprising:

a. determining at least one location of the vehicle; and

b. determining a likely second destination of said vehicle responsive to said at least one location of said vehicle, wherein said vehicle is possibly traveling from a known first destination to said likely second destination.

[c25] *25.* A method of determining a likely destination of a vehicle as recited in claim *24*, wherein said at least one location of the vehicle is determined with a vehicle location sensor in the vehicle.

[c26] *26.* A method of determining a likely destination of a vehicle as recited in claim *25*, wherein said vehicle location sensor comprises at least one of a GPS navigation system, an inertial navigation system, a dead reckoning navigation system, and a map matching navigation system.

[c27] *27.* A method of determining a likely destination of a vehicle as recited in claim *24*, wherein the operation of determining said likely second destination comprises: storing information about a previous driving pattern of said vehicle; and comparing said plurality of locations with said information characterizing said at least one route that was driven from said first destination to said possible second destination.

[c28] *28.* A method of determining a likely destination of a vehicle as recited in claim *27*, wherein said stored information comprises a likelihood that said vehicle at said first destination will travel to said second destination.

[c29] *29.* A method of determining a likely destination of a vehicle as recited in claim wherein said likelihood is calculated from at least one previous driving pattern of said vehicle.

[c30] *30.* A method of determining a likely destination of a vehicle as recited in claim *28*, wherein said likelihood is responsive to a measure of time.

[c31] *31.* A method of determining a likely destination of a vehicle as recited in claim *30*, wherein said measure of time comprises any or all of a time of day, a day of week, or a day of a year or month.

[c32] *32.* A method of determining a likely destination of a vehicle as recited in claim *27*, wherein said stored information comprises information characterizing at least one route that was previously driven from said first destination to a possible second destination.

[c33] *33.* A method of determining a likely destination of a vehicle as recited in claim *32*, wherein the operation of determining said likely second destination from said stored information comprises: recording a plurality of locations of said vehicle after departing said first destination; and using said plurality of locations to evaluate said information characterizing said at least one route that was driven from said first destination to said possible second destination.

[c34] *34.* A method of determining a likely destination of a vehicle as recited in claim *27*, wherein said stored information comprises information characterizing at least one route that had previously been driven and which leads from said at least one location of said vehicle to a possible second destination.

[c35] *35.* A method of controlling a hybrid electric vehicle, comprising:

a. determining at least one location of the vehicle in

advance of or during a first driving pattern of said vehicle, wherein said first driving pattern of said vehicle is associated with said vehicle traveling from a first destination to a likely second destination;

b. anticipating a likely second driving pattern of said vehicle, wherein the operation of anticipating said second driving pattern is responsive to said at least one location or to said first driving pattern of said vehicle, and said second driving pattern of said vehicle is associated with said vehicle traveling from said likely second destination to a likely third destination; and

c. controlling said hybrid electric vehicle during said first driving pattern responsive to the anticipation of said second driving pattern.

[c36] *36*. A method of controlling a hybrid electric vehicle as recited in claim *35*, wherein said at least one location of the vehicle is determined with a vehicle location sensor in the vehicle.

[c37] *37*. A method of controlling a hybrid electric vehicle as recited in claim *36*, wherein said vehicle location sensor comprises at least one of a GPS navigation system, an inertial navigation system, a dead reckoning navigation system, and a map matching navigation system.

[c38] *38*. ethod of controlling a hybrid electric vehicle as recited in claim *35*, wherein the operation of anticipating said likely sec.ond driving pattern of said vehicle comprises: anticipating said likely second destination responsive to said at least one location of said vehicle; and anticipating said likely second driving pattern responsive to said first destination, said likely second destination and/or said first driving pattern associated therewith.

[c39] *39*. A method of controlling a hybrid electric vehicle as recited in claim *38*, wherein the operation of anticipating said likely second driving pattern comprises: anticipating said likely third destination; and anticipating said likely second driving pattern responsive to said likely second destination and to said likely third destination.

[c40] *40*. A method of controlling a hybrid electric vehicle as recited in claim *39*, wherein the operation of anticipating said likely third destination comprises storing information about a previous driving pattern of said vehicle.

[c41] *41*. A method of controlling a hybrid electric vehicle as recited in claim *40*, wherein said stored information comprises a likelihood that said vehicle at said first destination will travel first to said second destination and then to said third destination.

[c42] *42*. A method of controlling a hybrid electric vehicle as recited in claim *41*, wherein said likelihood is calculated from at least one previous driving pattern of said vehicle.

[c43] *43*. method of controlling a hybrid electric vehicle as recited in claim *41*, wherein said likelihood is responsive to a measure of time.

[c44] *44*. A method of controlling a hybrid electric vehicle as recited in claim *43*, wherein said measure of time comprises any or all of a time of day, a day of week, or a day of a year or month.

[c45] *45*. A method of controlling a hybrid electric vehicle as recited in claim *41*, wherein the operation of anticipating said likely second driving pattern comprises: storing information about a previous driving pattern of said vehicle; and associating said stored information about said previous driving pattern of said vehicle with said stored information comprising said likelihood that said vehicle at said first destination will travel first to said second destination and then to said third destination.

[c46] *46*. A method of controlling a hybrid electric vehicle as recited in claim *35*, wherein the operation of controlling said hybrid electric vehicle comprises controlling at least one of a power generator of said hybrid electric vehicle,

an energy storage unit of said hybrid electric vehicle, and an electrical power controller of said hybrid electric vehicle.

[c47] *47.* A hybrid electric vehicle, comprising:

a. a power generator;

b. an energy storage device, wherein the hybrid electric vehicle is adapted to provide for selectively using power generated by said power generator to charge said energy storage device with stored energy;

c. a traction motor, wherein said hybrid electric vehicle is adapted to provide for selectively operating said traction motor from power generated by said power generator and/or power from a discharge of said stored energy from said energy storage device;

d. a vehicle location sensor, wherein said vehicle location sensor generates at least one measure of location of said hybrid electric vehicle;

e. a computer adapted to execute a stored program;

f. a memory operatively associated with said computer, wherein said stored program is adapted to record in said memory information related to at least one previous driving pattern of said vehicle based upon corresponding previously generated information from said vehicle location sensor, and said stored program is adapted to evaluate said at least

one measure of location in view of said information related to a previous driving pattern of said vehicle.

[c48] *48*. A hybrid electric vehicle as recited in claim *47*, wherein said stored program provides for anticipating a likely second destination from a known first destination responsive to evaluating said at least one measure of location in view of said information related to at least one previous driving pattern of said vehicle.

[c49] *49*. A hybrid electric vehicle as recited in claim *48*, wherein said stored program provides for controlling said power generator, said energy storage device, and/or a flow of power therebetween responsive to said at least one measure of location in relation to said likely second destination.

[c50] *50*. A hybrid electric vehicle as recited in claim *48*, wherein said stored program provides for determining a likely route leading to said likely second destination from at least one location corresponding to said at least one measure of location, responsive to said at least one measure of location, and to said at least one previous driving pattern of said vehicle stored in said memory.

[c51] *51*. A hybrid electric vehicle as recited in claim *50*, wherein said stored program provides for controlling

said power generator, said energy storage device, and/or a flow of power therebetween responsive to information stored in said memory related to said likely route.

[c52] *52*. A hybrid electric vehicle as recited in claim *48*, wherein said stored program provides for anticipating a likely third destination from a known first destination responsive to evaluating said at least one measure of location in view of said information related to at least one previous driving pattern of said vehicle, and said stored program provides for controlling said power generator, said energy storage device, and/or a flow of power therebetween over a route between said first destination and said likely second destination, responsive to information stored in said memory related to a likely route between said likely second destination and said likely third destination.

[c53] *53*. hybrid electric vehicle as recited in claim *48*, further comprising at least one environment sensor, wherein said stored program further provides for controlling said power generator, said energy storage device, and/or a flow of power therebetween over a route between said first destination and said likely second destination, responsive to information from said at least one environment sensor.

[c54] *54.* hybrid electric vehicle as recited in claim *47*, further comprising a map database operatively associated with said computer, wherein said map database provides information about a system of roads upon which said vehicle is operated, and by which said information related to said at least one previous driving pattern is structured.